Publication and Citation Patterns among LIS Faculty: Profiling a "Typical Professor"

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Abstract

Research on publication and citation patterns generally focuses on prolific or highly-cited authors or on highly-ranked programs. This study investigates the work and influence of a cross section of library and information science (LIS) researchers at various stages of their academic lives, using a random sample of faculty members at programs accredited by the American Library Association. The analysis shows that the number of publications increases steadily as faculty rank advances. Assistant professors publish more conference papers and fewer journal articles, a pattern that is reversed with associate and full professors. Web of Science reports no citations for most LIS faculty publications. With its broader scope, Google Scholar locates more

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citations, revealing that the works of professors are cited significantly more frequently than publications by assistant or associate professors. When faculty profiles are compared by type of program, faculty members at schools granting doctoral degrees publish significantly more than their counterparts at schools with no doctoral program or where the doctoral degree is offered jointly with other academic units. When the comparison is made across ranks, full professors publish significantly more than faculty members at other ranks but there is no significant difference between assistant and associate professors.

Introduction

Social history emerged as a reaction to earlier historians' focus on "great men" as the key to historical developments. Understanding history from the bottom up, social historians contend, provides a perspective that is at once more complex and more complete. However, the lives and contributions of common people can be difficult to uncover and document; even among the upper classes there are many near-great and would-be-good for each lionized star.

Rankings and ratings take something of a "great man" approach, focusing attention on high profile, high achieving institutions, programs, and individuals. These analyses, however, generally do not paint a complete picture of the population from which the élite stand out — what might be referred to as the long tail of lesser achievers. Observing the full range of activity for a field or discipline can provide context for assessing the accomplishments of the eminent few as well as a sense of the contributions of the many.

Such an analysis for the field of library and information science (LIS) can provide additional perspective on the nature and extent of all LIS faculty members' contributions to the literature. Specifically, how much, how often, and with what effect do faculty members typically publish? How is an "average" faculty member's career reflected through publication and citation? Does employment in a program offering a doctoral degree affect faculty productivity and citation? In addition to adding detail to our picture of academic life, answers to these questions may provide useful perspectives on faculty recruitment, retention, and promotion. For example, candidates for faculty positions and search committees could communicate more effectively if they held similar expectations of research productivity. Similarly, tenure and promotion reviews could benefit from understanding how a faculty member's research contributions compare with what is typical for the field.

Review of the Literature

LIS has been the subject of many bibliometric and perception studies: for example, rankings of schools (Adkins & Budd, 2006; Cronin & Overfelt, 1996) and listings of highly cited authors (Cronin & Meho, 2006; Oppenheim, 2006). Wallace's (1990) short article and the more extensive work by Pettigrew and Nicholls (1994) are among the few to attempt to describe the field as a whole. Cronin and Davenport (1996) took a different approach, intentionally focusing on a subset of the field where they expected to observe below-average scholarly output. There are intriguing conjectures about different publication and citation patterns, depending on faculty rank, status of academic program, and the nature of publication and citation (e.g., print versus online).

Hayes's (1983) early work, followed by studies by Budd and colleagues (Adkins & Budd, 2006;

Budd, 2000; Budd & Seavey, 1996) of LIS faculty productivity are based on publications and citations to those publications reported in the *Social Sciences Citation Index* (*SSCI).* Given the number of individuals (746 in Adkins and Budd's study covering 1999-2004) and the few sources for citation searching when the project began, using *SSCI* as the source of information was appropriate; to maintain consistency, *SSCI* has continued to be the basis for subsequent analyses. However, limiting the citation analysis to *SSCI* data necessarily focuses only on journal articles (and papers presented at a few conferences) (Adkins & Budd, 2006, p. 376). Budd and colleagues' reports have presented the most cited individuals and the academic programs receiving the most citations (in "top 20" lists). In discussion of the field as a whole, Budd and colleagues noted a statistically significant difference by faculty rank in the percentage of faculty members who had at least one publication (rising from 45.6% of assistant professors to 57.1% of professors in the 2006 report). The percentage of individuals receiving at least one citation also differed significantly (58.1% of assistant professors, 89.9% of professors). Journal articles per capita were reported for only the top 20 programs; the number ranged from 2.25 to 7.64.

Pettigrew and Nicholls (1994) examined publications of all LIS faculty members for the period 1982-1992. They used five bibliographic databases to identify publications: *Educational Resources Information Center*, *Library and Information Science Abstracts*, *PASCAL* (produced by the Institut de l'Information Scientifique et Technique of the French National Research Council), *SSCI*, and *Library Literature*. Unlike Budd and his colleagues, who studied only "articles," Pettigrew and Nicholls included monographs, journal articles (refereed and not), conference papers, edited works, letters to editors, and book reviews—finding a total of 7,937 items published by 607 individuals. Some 57 individuals (9% of their population) had no publications. Pettigrew and Nicholls compared mean productivity per faculty member by type of institution (whether it offered a Ph.D. or a master's degree only). Mean productivity in the Ph.D.-granting institutions was 16.6 publications per faculty member over the eleven years examined (1.51 per year); for the master's only institutions the mean was 9.55 (0.87 per year). The statistically significant difference persisted when comparing mean journal articles per faculty member (10.55 compared with 5.97) and mean peer-reviewed journal articles per faculty member (4.58 compared with 2.85).

Cronin and Davenport (1996) assessed productivity for 61 faculty members whose research focused on children's and school library services. They found a mean of 11.1 publications per faculty member over the eleven-year period studied (ranging from 5.3 for assistant professors to 16.1 for professors). The mean number of refereed articles was 3.3, with an average of only 0.3 refereed articles per year. Bates (1998) compared the number of publications for senior faculty members (associate and full professors) at four high-ranking LIS schools. From the means she reported (Table 2), the average over an eight-year period was 7.3 refereed articles per person (0.9 per year) and 8.7 "book reviews, columns, etc." (1 per year). She also investigated the number of books written, books edited, and review articles written; over a 17-year period, these faculty members averaged 1.6 books (0.9 per year) and 1.9 edited books/review articles (0.9 per year).

Several studies have examined the citations to LIS faculty publications. Budd and various colleagues (Adkins & Budd, 2006; Budd, 2000; Budd & Seavey, 1996) have, as noted, used *SSCI* citation counts to identify the most highly cited programs and individuals. Brace (1992) examined output of and citations received by LIS faculty. He noted that each school has "one or two individuals who tend to be the major producers of *articles*, which in turn draw the largest number of *citations*" (p. 121). In their analysis of citations to the works of all faculty members in one LIS program, Cronin and Overfelt (1994) also found that distributions of both contributions to, and citations from, the literature of the field were highly skewed—a small number of "stars" contributed and were cited much more frequently than their colleagues.

Meho and Yang (in press) used Web of Science, Google Scholar, and Scopus to locate citations to publications by 25 LIS faculty members. They found that all three sources contributed unique citations; Google Scholar, although it required considerably more work, was particularly effective in locating citations from journals and conference proceedings not covered by Web of Science as well as dissertations, theses, technical reports, and other sources. Vaughan and Shaw (in press) compared citations identified through Web of Science, Google, and Google Scholar to LIS faculty publications. They found that Google Scholar located significantly more citations than did Web of Science and that 92% of the Google Scholar citations were from journal articles, conference papers, reports, books, or theses and thus represented intellectual impact of the item cited.

As this brief review indicates, there is evidence that LIS faculty members vary considerably in the extent to which they contribute to and are cited by the literature of the field. The advent of Web-based citation identification tools may provide a means to produce a more complete picture of the impact of these various publications.

Procedures

Creating the Sample

Creating a representative sample of publications by LIS faculty began by identifying all tenured and tenure-track faculty members at the 56 schools with programs accredited by the American Library Association as of fall 2005. Which schools offered a doctoral degree, which offered a joint doctoral degree with another academic unit, and which offered master's (and specialization) degrees but had no doctoral program was noted. Emeriti faculty, lecturers, and adjunct faculty were excluded. The resulting list of 720 people included 257 assistant professors, 229 associate professors, and 234 professors.

Thirty names from each rank (approximately 12% of the population) were selected using a random number table. These faculty members' journal and conference publications, books, and book chapters were identified from online CVs (if available) and through author searches in *Library Literature & Information Science*, *INSPEC*, *SSCI*, and *Inside Conferences* — the sources Meho and Spurgin (2005, pp. 1328-1329) identified as "the four periodical databases that provide the most comprehensive coverage of the periodical literature." The resulting bibliography of all 90 faculty members included 325 items by assistant professors (three assistant professors, or 10%, had no publications), 573 by associate professors (two, or 6.7%, had no publications), and 1,188 by professors (no professors were without publications). The resulting bibliography contained 2,086 publications. As a point of comparison, Meho and Yang (in press) generated a bibliography of 1,093 publications by 15 faculty members at one LIS school.

This approach to selecting the publications to examine is, of course, open to criticism. For example, requiring that authors be affiliated with an American Library Association-accredited master's degree program excluded some actual and potential contributors to research in the field. However, it assured a certain amount of similarity in background, career trajectory, and expectations of the authors. Faculty members who had changed names would have only a portion of their work included unless they had provided a complete bibliography with an online CV. Faculty affiliations were listed as the current place of employment; each faculty member was considered an autonomous agent, carrying with him or her the publications and citations of an academic lifetime. These limitations are acceptable because the intention is not to study or rank individual schools or programs. In this analysis each author in a multiple-author work received full credit for the publication: the "complete count" method (Long, McGinnis, & Allison, 1980).

Types of Publications

There is an ongoing debate about whether open access (sources freely available on the Web) increases the speed and/or frequency with which a work is cited (Harnad & Brody, 2004; Testa & McVeigh, 2004). To allow analysis by type of publication, each item was identified as a book, book chapter, conference paper, electronic journal article (open access—available free of charge), refereed journal article (available in print; some also available online, but for a fee) and non-refereed journal article. Refereeing status was established through Ulrich's Periodicals Directory. Print and electronic journals were counted separately because the nature of their citation was markedly different (see Tables 6, 7, and 8). Because there were only 58 electronic journal articles, they were not differentiated by refereeing status. Of the 20 different electronic journals in which these faculty members published, only one, *D-Lib Magazine*, is not refereed; it published two articles by professors at each rank, for a total of six.

Citation Searches

The items in the sample were searched in Web of Science and the number of citations recorded. Each item was then searched in Google and Google Scholar and the number of hits was recorded. For these Web searches the searcher entered the article title as a phrase search; titles that were not sufficiently distinctive to retrieve only the citations to the article were supplemented with authors' last names, or the title of the journal, or both, whichever made the results more precise. Google Scholar, with its smaller database, typically required shorter queries than those for Google. If Google indicated that some items had been omitted, the searcher selected "repeat the search with the omitted results included." The searcher then scanned the search result for false drops and recorded the number of actual hits.

Findings

Publication Profile

Tables 1, 2, and 3 describe the kinds of publications and publishing activity evidenced in the 2,086 publications, the complete scholarly output of 90 LIS faculty members.

Rank	Minimum	Maximum	Mean	Median	Standard Deviation
assistant professor	0	53	10.8	7	11.8
associate professor	0	55	19.1	17.5	15.7
full professor	4	114	39.6	32	30.0

Table 1. Number of publications

The maximum numbers of publications for both assistant and associate professors were over 50.

These included all types (book [each edition counted separately], book chapter, conference paper, journal article). The mean and the median increased gradually over a faculty member's academic lifetime. The difference between the minimum and maximum number of publications was significant at all ranks.

Rank	Minimum	Maximum	Mean	Median	Standard Deviation
assistant professor	4	32	11.1	10	6.7
associate professor	4	30	16.5	14.5	8.0
full professor	12	42	24.9	24	6.6

Table 2. Years of active scholarship

From the list of each person's publications, the year of the first publication was determined (X). Then the "years of active scholarship" was calculated as 2005-X (the publication list was compiled between the end of 2005 and early 2006). Although the year the Ph.D. was awarded is frequently taken as the commencement of one's scholarly life, there were several instances of publication (and citation) well before the award of the terminal degree.

The mean and the median years of active scholarship for assistant professors were 11 and 10, respectively. Thus, by the time of promotion and tenure, an average faculty member had been publishing for at least 10 years, presumably beginning well before entering the tenure track (assuming that promotion and tenure reviews are typically conducted after 5 to 7 years as assistant professor). The "average professor" had 25 years of active scholarship.

	Assistant Professor	%	Associate Professor	%	Full Professor	%
book chapter	7	2.2	19	3.3	14	1.2
conference paper	150	46.2	190	33.2	178	15.0
e-journal	15	4.6	30	5.2	13	1.1
print refereed journal	114	35.4	230	40.1	667	56.1
print non-refereed journal	30	9.2	88	15.4	228	19.2
book	9	2.8	16	2.8	88	7.4
Total (each rank)	325	100	573	100	1188	100

Table 3. Types of publications

Table 3, analyzing types of publications, indicates that conference papers, which accounted for 46% of assistant professors output, declined as a percentage of publications as the faculty member advanced in rank. Conference papers accounted for 33% of associate professors' publications and only 15% for professors. Over time, publication in refereed print journals, non-refereed print journals, and books increased as a percentage of output as a faculty member rose through the ranks. This may also reflect a generational difference, with conference presentations becoming increasingly important as the field has developed. Book chapter and e-journal publication, although small fractions of the publications at each rank, were most common for associate professors, followed by assistant, then full professors.

The publication profile of an average, or "typical," faculty member, was constructed by dividing the numbers in each cell of Table 3 by 30 (30 people in each rank) and rounding to the nearest integer. Table 4 shows a quick impression of the publication profile at each rank. For example, an average assistant professor had published no books or book chapters, five conference papers, one e-journal paper, four refereed print journal papers, and one non-refereed print journal paper.

	Assistant Professor	Associate Professor	Full Professor
book chapter	0	1	0
conference paper	5 (0.32 per year)	6 (0.29 per year)	6 (0.19 per year)
e-journal	1	1	0
refereed print journal	4 (0.25 per year)	8 (0.35 per year)	22 (0.72 per year)
non-refereed print journal	1	3	8
book	0	1	3

Table 4. Average lifetime publication profile

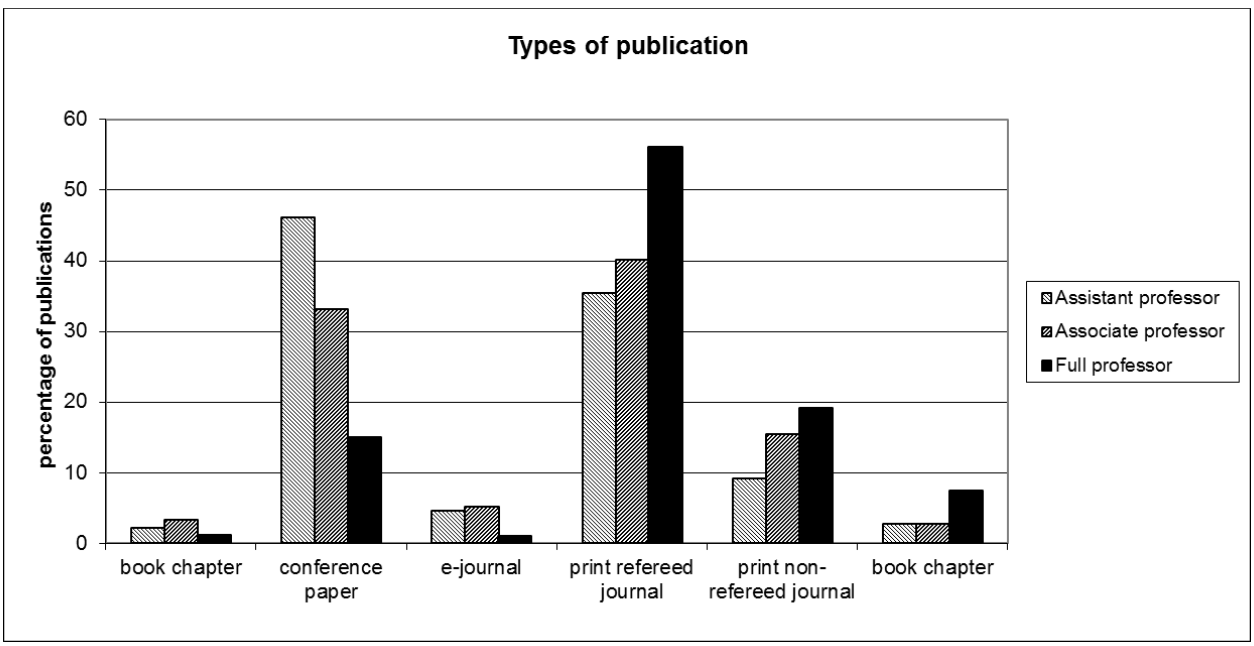

Figure 1, Distribution of the types of publication

A chi-square test on Table 3 data shows that there was a significant relationship ($p<.001$) between the type of publication and rank. Data in Table 3 (and Figure 1) show that professors published more books but fewer book chapters than either assistant or associate professors. Professors also contributed fewer e-journal and conference papers but more print journal papers (both refereed and non-refereed). Assistant and associate professors were similar to each other but associate professors had a few more print journal papers and slightly fewer conference papers. It would appear that assistant professors tended to use conference papers as way to begin their contributions to the literature.

Number of Publications per Year

It is possible to make a rough approximation of the effort devoted to publishing by counting the number of publications per year=X/Y, where X is a faculty member's total number of publications and Y is the number years of active scholarship (2005 minus year of the first publication). The results are presented in Table 5.

Rank	n	Minimum	Maximum	Mean	Median	Standard Deviation
assistant professor	30	0	5.43	1.14	0.7	1.24
associate professor	30	0	4.36	1.25	0.88	1.0
full professor	30	0.14	4.60	1.62	1.29	1.22

Table 5. Number of publications per year

A one-way analysis of variance test shows that there was no significant difference ($p=0.259$) by professorial rank in terms of number of publications per year. Although professors had more publications (see Table 1), their larger numbers of publications presumably results from more years of active scholarship. On an annual basis, they had not published significantly more than faculty members in other ranks. On average, faculty members in all three ranks published just over one publication per year (mean=1.34, median=1.04 when all three groups were combined). However, care must be taken in interpreting these data. The calculation included all types of publications. Publishing a book is not the same as publishing a conference paper. As Table 3 shows, 7.4% of professors' publications are books but books account for only 2.8% of assistant and associate professors' publications. For assistant professors, the most common type of publication was a conference paper (46.2%). In contrast, a print refereed journal article was the most common type of publication for associate professors (40.1%) and professors (56.1%).

The average number of conference papers published per year declined with rank. Combining data from Tables 3 and 5 makes it possible to estimate the number of conference papers and referred print journal articles per year (presented parenthetically in Table 4; the median number of publications per year multiplied by the percentage of publications in each type). Assistant professors produced an annual average of slightly more than 0.3 conference papers; associate professors just under 0.3 conference papers and professors just under 0.2. For refereed journal articles, the trend was in the opposite direction. Assistant professors published almost 0.3 refereed articles per year; associate professors published almost 0.4; and professors averaged slightly more than 0.7 refereed articles per year. Figure 2 shows these trends.

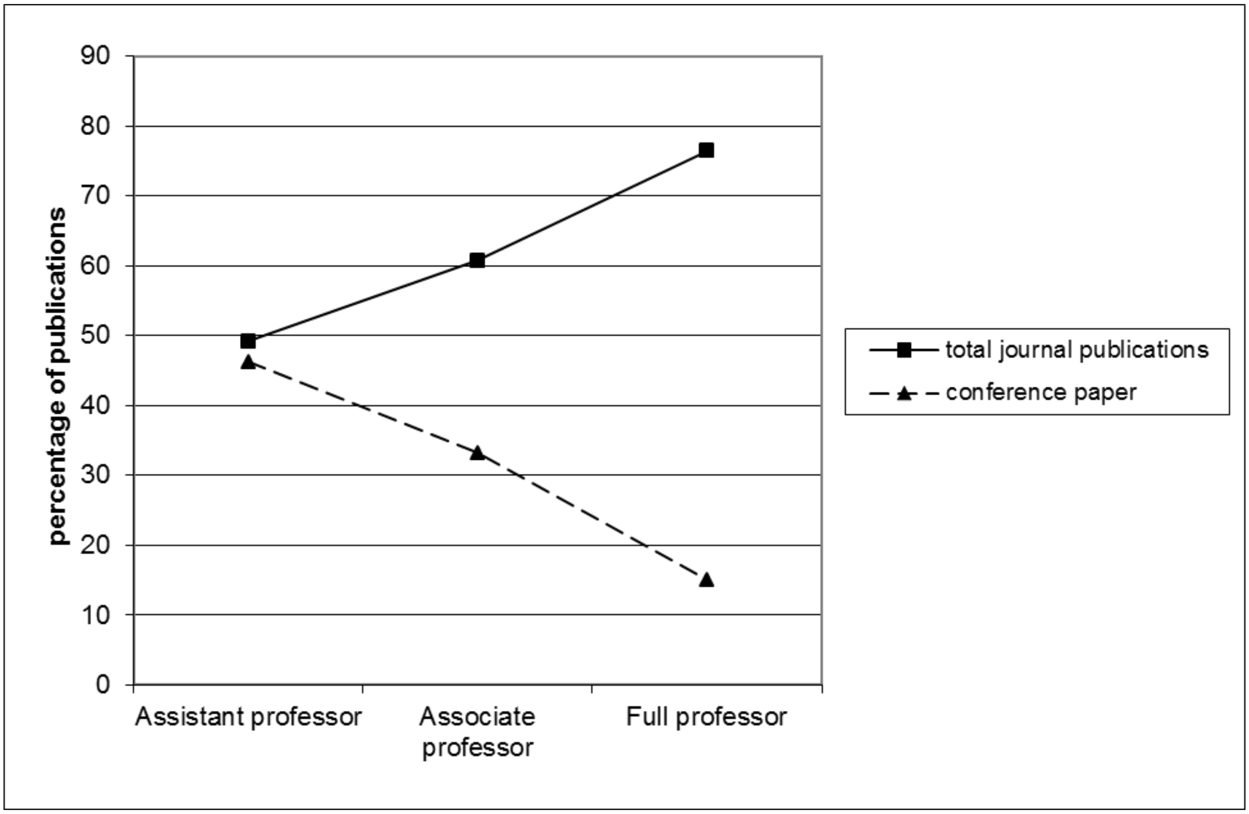

Figure 2. Percentage of publications that appear as conference papers and journal articles, by rank

Citation Profile

It is also possible to assess the impact, as measured by citation, of these faculty publications. There was considerable variation in number of citations located through Web of Science, Google, and Google Scholar, (Meho & Yang, in press); therefore all three of these sources were used to identify citations. The data presented in Tables 6, 7, and 8 are based on 1,483 publications: 325 by assistant professors 573 by associate professors, and 585 by professors (because the total number of publications by professors was large [1,188], a random sample was selected for this analysis).

	Number	WoS mean	WoS median	Google mean	Google median	Google Scholar mean	Google Scholar median
book chapter	7	1.86	0	92.29	59	9.43	3
conference paper	150	0.41	0	31.55	11	5.3	1
e-journal article	15	.33	0	81.87	42	6.6	3
print journal article	144	2.17	0	33.5	9	5.17	1
book	9	.22	0	14.22	4	.56	0

Table 6. Citations to assistant professors' publications

	Number	WoS mean	WoS median	Google mean	Google median	Google Scholar mean	Google Schola r median
book chapter	19	1.95	0	66.58	24	19.37	3
conference paper	190	1.06	0	25.1	6.5	5.51	1
e-journal article	30	1.37	0	53.8	34.5	5.53	3
print journal article	318	3.18	0	25.4	10	4.18	2
book	16	11.63	5	123.31	71	10.38	9

Table 7. Citations to associate professors' publications

	Number	WoS mean	WoS median	Google mean	Google median	Google Scholar mean	Google Scholar median
book chapter	6	0	0	23.67	23.5	4.67	3
conference paper	92	1.09	0	36.45	17	9.96	3
e-journal article	4	0.5	0	169.75	129.5	12.25	8
print journal article	395	3.33	0	21.83	10	5.31	2

book	88	4.26	1	60.87	38	6.29	3

Table 8. Citations to professors' publications

The majority of publications were not cited in the Web of Science; the average for all ranks was 63.2% of publications not cited (78.5% of assistant professors' publications, 63% of associate professors, 54.9% of professors; see Table 9). Google Scholar and Google located Web citations to more of the publications. The percentage of publications uncited in Google Scholar averaged 31% (38.8% for assistant professors, 29.3% for associate professor, and 28.4% for professors). In Google the average uncitedness was 6.1%, with assistant professors' publications receiving the highest rate of citation (3.7% uncited for assistant professors, 5.1% for associate professor, and 8.4% for professors).

Web of Science				
assistant professors	325	70	255	78.5%
associate professors	573	212	361	63.0%
professors	585	264	321	54.9%
total	1483	546	937	63.2%
Google				
assistant professors	325	313	12	3.7%
associate professors	573	544	29	5.1%
professors	585	536	49	8.4%
total	1483	1393	90	6.1%
Google Scholar				
assistant professors	325	199	126	38.8%
associate	573	405	168	29.3%

professors				
professors	585	419	166	28.4%
total	1483	1023	460	31.0%

Table 9. Number and percentage of publications uncited

Because the frequency distributions of citation counts were skewed, the median, rather than the mean should be used. The median number of citations identified through Web of Science was almost always zero, which made it impossible to compare different groups of professors using these data. Moreover, there were not enough data points to do appropriate statistical analysis for book chapters, books, or e-journal articles. Therefore only conference papers and print journal articles (including both refereed and non-refereed journal articles) were compared.

The median number of citations found using Google and Google Scholar was higher and provided a basis for comparison. However, it was not appropriate to compare the three groups using these median figures directly. The Web as we know it has existed for about ten years. Works published before the advent of the Web (notably a larger portion of professors' publications) arguably have a smaller chance of receiving Web citations. On the other hand, works published in the last three or four years may not have had enough time to accumulate citations. Therefore, citation statistics were recalculated for works published between 1996 and 2002 (inclusive). The results are presented in Tables 10, 11, and 12.

	Number	Google mean	Google median	Google Scholar mean	Google Scholar median
conference paper	68	42.84	14	8.68	2.5
print journal article	66	42.36	10	7.06	1

Table 10. Web citations to assistant professors' conference papers and print journal articles, 1996-2002

	Number	Google mean	Google median	Google Scholar mean	Google Scholar median
conference paper	89	36.96	10	7.85	2
print journal article	143	27.55	15	4.36	2

Table 11. Web citations to associate professors' conference papers and print journal articles, 1996-2002

	Number	Google mean	Google median	Google Scholar mean	Google Scholar median
conference paper	43	51.72	38	13.79	7
print journal article	111	32.76	18	8.12	2

Table 12. Web citations to professors' conference papers and print journal articles, 1996-2002

Of the two types of Web citations, Google Scholar's are more likely to represent intellectual impact and were preferred over Google's. Because the frequency distributions of Google Scholar citations were all highly skewed, the Kruskal-Wallis test, a non-parametric test, was used.

For conference papers, there was a significant difference (p=0.008). Professors have more Google Scholar citations but there is no significant difference between assistant and associate professors. The medians of Google Scholar citations were 2.5, 2, and 7 for assistant, associate, and full professors, respectively. For print journal articles there was no significant difference (p=0.085). The medians were 1, 2, and 2 for the three ranks.

<u>Comparison of Doctoral-Degree-Granting and Master's Degree Programs</u>

A two-way analysis of variance test (ANOVA) was conducted with the number of publications per person as the dependent variable and the type of school (those offering the master's degree [n=13], those offering a doctoral degree jointly with other academic units [n=8], and those offering a doctoral degree under the auspices of the school alone [n=25]) and faculty rank as the independent variables. Table 13 shows that there was a significant difference (p<.01) among the three types of schools in the number of publications per faculty member.

Type of school	Average number of publications per person	Number of people in this group
independent Ph.D.	29.64	53
joint Ph.D.	14.06	16
master's	13.81	21

Table 13. Average number of publications per person for each type of school

A post-hoc Tukey test further showed that the mean of independent doctoral program schools was significantly higher than that of the other two types; there was no significant difference between schools with joint doctoral programs and those offering only master's degrees. Figure 3 shows the mean number of publications per person for each school and each type of professors. It visually confirms the ANOVA result.

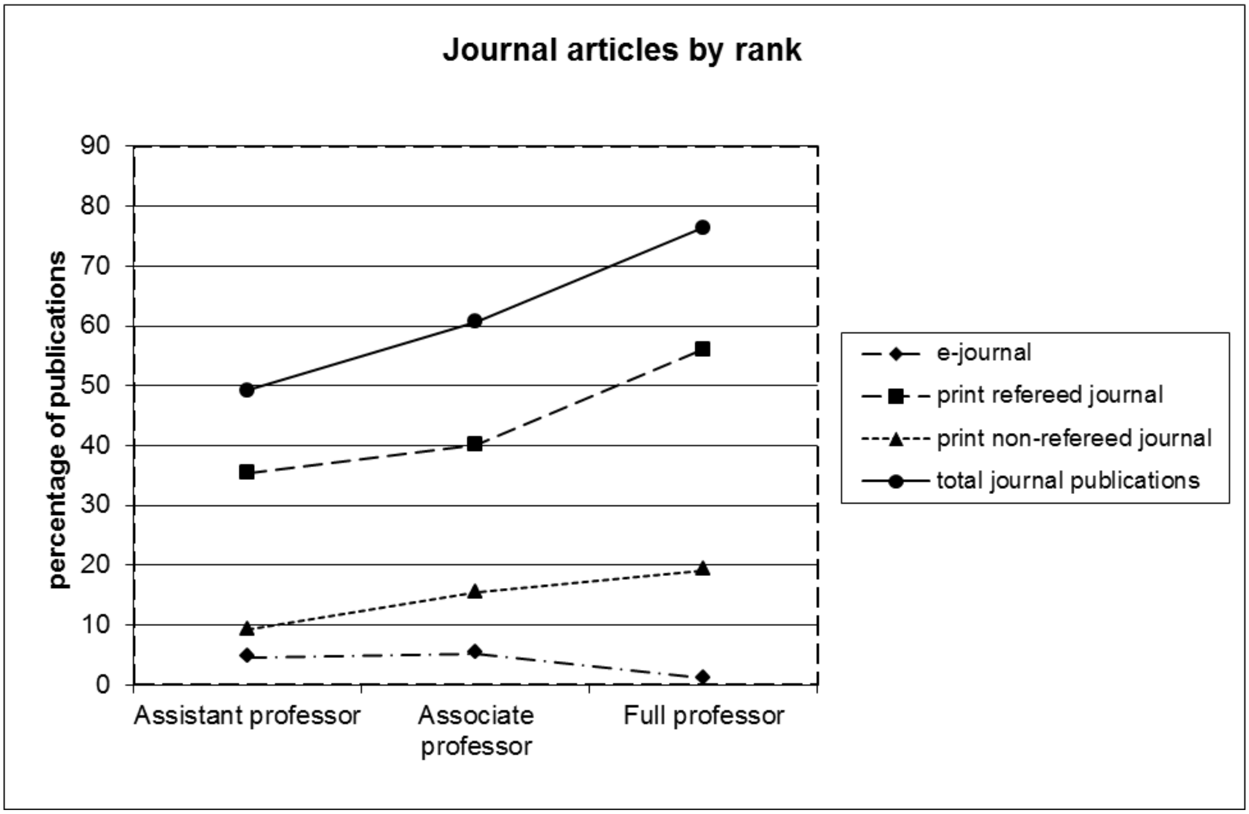

Figure 3. Average number of publications per faculty member by type of program

The ANOVA results show a significant difference ($p<.01$) among the three types of professors and the Tukey test shows the following pattern: professors published significantly more than the faculty members in other ranks but there was no significant difference ($p>.05$) between assistant and associate professors. This pattern is clear in Figure 3, where the data points for professors are positioned significantly higher than those for the other two ranks. ANOVA results also show that there was no significant interaction between the two independent variables ($p=0.236$), which means that the differences among the three types of schools were consistent for all three ranks.

Discussion

This study was based on a random sample of 90 LIS faculty members and analyzed all of their publications, from the first year of publication through 2005. These representative faculty members produced 2,086 papers, chapters, articles, and books. The number of publications ranged from 0 (for three assistant professors and two associate professors) to 114 (for one professor); the median number of publications rose from 7 (for assistant professors), to 17.5 (associate professors), to 37 (professors). The standard deviations were fairly large, indicating considerable variability among faculty members. It is worth noting that the standard deviation rose as with rank; this means that performance gaps (variabilities) increased over the years. Productive people tended to be more productive over time and non-productive people lagged further behind. Assistant professors had published their first contribution a median of 10 years before the data were collected, which hints that active contribution to scholarship often begins before completion of the Ph.D. Cronin and Meho (in press) also found high impact, pre-doctorate publications by "intellectual innovators" in information science.

This trend of increasing number of publications with rank would sensibly be expected of academic careers, although it contrasts with the dip in associate professor productivity Cronin and Overfelt (1994) reported. Their detailed analysis of citations to faculty in a single LIS program revealed an "inverse relationship between status and salary... and citation scores," with assistant professors in this school publishing and being cited more frequently than associate professors. Such a "post-tenure slump" could reflect a more nuanced perspective on academic life: faculty members pursuing their inclinations for increased emphasis on teaching and service, for example, after clearing the tenure hurdle (Cronin & Overfelt, 1994, p. 70). Adkins and Budd (2006), however, noted an increase in associate professors' productivity between 1981-1992 and 1993-2004.

The median annual publication rate was 0.7 publications per year for assistant professors, 0.9 for associate and 1.3 for full professors (Table 5). This appears to be a bit below the reports from other studies. Cronin and Davenport (1996) reported a mean of one publication per year for LIS faculty in the children and schools areas; re-calculating their data with more precision, however, the mean annual number of publications is also 0.7. Pettigrew and Nicholls's (1994) faculty productivity figures show, for Ph.D.-granting institutions, an average of 1.5 publications of any type per year; faculty at master's-degree-granting institutions published an annual average of 0.9 publications of any type.

Conference papers accounted for 46.2% of assistant professors' publications; refereed print journal articles represented 35.4% of their output. For associate professors, refereed print journal articles accounted for 40.1%, and conference papers 33.2%, of their publications; and professors' refereed print journal articles represented 56.1%, with conference papers only 15% of their output. The relationship between type of publication and faculty rank was statistically significant (assistant professors emphasizing conference papers, associate and full professors producing more journal articles). This pattern is in line with advice to and expectations of doctoral students. It also reflects standard timelines of scholarly publication (e.g., Garvey & Griffith, 1967), in which work presented at conferences is subsequently developed for journal publication.

Some 63.2% of these faculty members' publications were not cited in Web of Science. This is not widely off the mark from Schwartz's (1997) report of 72% uncitedness for LIS. The median number of Web of Science citations was zero. At the opposite extreme were Bates's (1998, Table 3) associate and full professors at highly-ranked LIS schools; their average citation count was 78.3 per year. Adkins and Budd (2006, Table 7) report citation rates for only the top 20 programs; the rate ranges from 2.8 to 14.7 *SSCI* citations per year for this élite group. For LIS faculty as a whole, 47% had no citations during the six years Adkins and Budd studied. Cronin and Davenport (1996), who selected a sub-field they believed was "demonstrably weaker in research terms" (p. 1) and "operates outside the norms of scholarship" (p. 2). These faculty members received a mean of 0.6 citations per year (Cronin & Davenport, 1996, Table 4); it is quite possible that the median for this group is also zero, given the probable skew of the citation counts.

Google Scholar was used as a source to locate additional citations because: 1) Google Scholar citation counts correlate well with Web of Science citation counts, the standard on which most earlier studies of citedness has been based; and 2) most Google Scholar citations represent intellectual impact (Vaughan & Shaw, in press). Refereed print journal articles by professors did not receive more citations in Google Scholar than those by assistant or associate professors. Some 75.3% of professors' publications were print journal papers (including both refereed and non-refereed journal papers) and they had more of these publications than assistant and associate professors (see Table 3). Professors published fewer conference papers but those papers attracted more citations than conference papers by assistant and associate professors. The number of Google Scholar citations to conference papers was statistically significantly greater for professors than for assistant or associate professors. One possible reading is that, as the number of conference papers a faculty member produces declines as a percentage of output (a trend as one is promoted to higher rank), the conference papers that are produced provide greater impact (for example as keynote addresses that would likely reach larger audiences).

Several authors have speculated about a correlation between a school's offering a doctoral degree and the research productivity or impact of its faculty (e.g., Bates, 1998; Brace, 1992; Wallace, 1990). Schools offering their own doctoral degrees consistently had more productive faculty members, in contrast to Brace's (1992) finding. There was no significant difference between schools offering only a master's degree and schools offering a doctoral degree jointly with other academic units in terms of faculty research productivity by rank. In all three types of schools, professors were more productive than their colleagues at the other two ranks. However, assistant and associate professors performed similarly. This is in accord with Pettigrew and Nicholls's (1994, p. 147) observation that "the publishing profile of an assistant professor does not differ substantially whether a Ph.D. or master's LIS program is involved."

Table 1 shows considerable diversity in faculty publication profiles. The standard deviation in number of publications grows from 11.8 for assistant professors to 30.0 for professors. Thus the mean numbers of publications graphed in Figure 3 (comparing faculty rank by school type) represent considerable scatter around the lines represented. Additional research might shed light on the absence of significant difference between assistant and associate professors in all three types of schools. These data suggest that assistant professors could move most easily from one type of school to another, that associate professors still retain some mobility by type of school, but that professors would very seldom make the transition. The range of productivity also suggests that, even at research-intensive schools, some faculty members do not publish with great frequency and/or their work is not highly cited. A more complete understanding of LIS as a field should take account of teaching and service contributions, for example, as other important considerations in recruitment and retention of faculty members. Cronin (1995) and Giles and Councill (2004) have suggested the study of acknowledgments as one way to find evidence for these contributions.

Conclusion

This review provides perspective on the nature and impact of LIS faculty publication as a whole, rather than focusing on the work of the most productive or most cited. In some ways the picture painted is what would be expected of academic life. The number of publications increases steadily with faculty rank. Assistant professors publish more conference papers and fewer journal articles, a pattern that is reversed with associate and full professors. Comparing faculty profiles by type of school reveals that those at schools granting doctoral degrees publish significantly more than their counterparts at schools with no doctoral program or where the doctoral degree is offered jointly with other academic units. When the comparison is made by rank, full professors publish significantly more than faculty members in the other two ranks but there is no significant difference between assistant and associate professors.

Considering the impact of LIS faculty publications, Web of Science reports no citations for most contributions to the literature. This is in line with other large-scale analyses using Web of Science data. Because of its wider scope, Google Scholar identifies more citations; it reveals that the work of professors is cited significantly more frequently than publications by assistant or associate professors.

As the median numbers of publications and citations indicate, most LIS faculty members make modest contributions to the literature of their field. By definition, a world where “everyone is above average” is impossible; this study has provided a glimpse of the population from which the LIS luminaries are outstanding. The findings raise questions for how LIS or any field, is perceived and lived by the majority. Faculty members who do not excel in research *do* contribute to academic life. It is to be hoped that understanding the varied nature of contributions will inform recruitment, tenure, and promotion decisions. Including sources of evidence beyond Web of Science makes these faculty members’ contributions more readily apparent.

References

Adkins, D., & Budd, J. (2006). Scholarly productivity of U.S. LIS faculty. *Library & Information Science Research*, *28*(3), 374-389.

Bates, M. J. (1998). The role of publication type in the evaluation of LIS programs. *Library & Information Science Research*, *20*(2), 187-198.

Brace, W. (1992). Quality assessment of library and information science faculties. *Education for Information*, *10*(2), 115-123.

Budd, J. M. (2000). Scholarly productivity of U.S. LIS faculty: An update. *Library Quarterly*, *70*(2), 230-245.

Budd, J. M., & Seavey, C. A. (1996). Productivity of U.S. library and information science faculty: The Hayes study revisited. *Library Quarterly*, *66*(1), 1-20.

Cronin, B. (1995). *The scholar's courtesy: The role of acknowledgement in the primary communication process*. London: Taylor Graham.

Cronin, B., & Davenport, E. (1996). Conflicts of jurisdiction: An exploratory study of academic, professional, and epistemological norms in library and information science. *Libri*, *46*(1), 1-15.

Cronin, B., & Meho, L. (2006). Using the *h*-index to rank influential information scientists. *Journal of the American Society for Information Science and Technology*, *57*(9), 1275-1278.

Cronin, B. & Meho, L. I. (in press). Timelines of creativity: A study of intellectual innovators in information science. *Journal of the American Society for Information Science and Technology*.

Cronin, B., & Overfelt K. (1994). Citation-based auditing of academic performance. *Journal of the American Society for Information Science*, *45*(2), 61-73.

Cronin, B. & Overfelt K. (1996). Postscript on program rankings. *Journal of the American Society for Information Science*, *47*(2), 173-176.

Garvey, W. D., & Griffith, B. C. (1967). Scientific communication as a social system. *Science*, *157*(3792), 1011-1016.

Giles, C. L., & Councill, I. G. (2004). Who gets acknowledged: Measuring scientific contributions through automatic acknowledgment indexing. *Proceedings of the National Academy of Sciences of the United States of America*, *101*(51), 17599-17604.

Harnad, S., & Brody, T. (2004). Comparing the impact of Open Access (OA) vs. non-OA articles in the same journals. *D-Lib Magazine*, *10*(6). Retrieved March 3, 2007, from http://www.dlib.org/dlib/june04/harnad/06harnad.html

Hayes, R. M. (1983). Citation statistics as a measure of faculty research productivity. *Journal of Education for Librarianship*, *23*(3), 151-172.

Long, J. S., McGinnis, R., & Allison, P. D. (1980). The problem of junior-authored papers in constructing citation counts. *Social Studies of Science*, *10*(2), 127-143.

Meho, L. I., & Spurgin, K. M. (2005). Ranking the research productivity of LIS faculty and schools: An evaluation of data sources and research methodologies. *Journal of the American Society for Information Science and Technology, 56*(12), 1314-1331.

Meho, L. I., & Yang, K. (in press). Impact of data sources on citation counts and rankings of LIS faculty: Web of Science vs. Scopus and Google Scholar. *Journal of the American Society for*

Information Science and Technology. Retrieved March 3, 2007, from http://www.slis.indiana.edu/faculty/meho/meho-yang-03.pdf

Oppenheim, C. (2006). Using the *h*-index to rank influential British researchers in information science and librarianship. *Journal of the American Society for Information Science and Technology*, *58*(2), 297-301.

Pettigrew, K. T., & Nicholls, P. T. (1994). Publication patterns of LIS faculty from 1982-1992: Effects of doctoral programs. *Library & Information Science Research*, *16*(2), 139-156.

Schwartz, C. A. (1997). The rise and fall of uncitedness. *College & Research Libraries*, *58*(1), 19-29.

Testa, J., & McVeigh, M. E. (2004). *Open access journals in the ISI citation databases: Analysis of impact factors and citation patterns*. Retrieved March 3, 2007, from http://www.webcitation.org/query?id=95154

Vaughan, L., & Shaw, D. (in press). A new look at evidence of scholarly citation in citation indexes and from Web sources. *Scientometrics*.

Wallace, D. P. (1990). The most productive faculty. *Library Journal*, *115*(8), 61-63.